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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SHAH, CHIRAG G	
ART UNIT	PAPER NUMBER
2664	

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/780,895	JI ET AL.	
	Examiner	Art Unit	
	Chirag G Shah	2664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,8 and 13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9-12 and 14* is/are allowed.

6)☒ Claim(s) *1-5,8 and 13* is/are rejected.

7)☒ Claim(s) *6 and 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/9/01*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, 8 and 13, rejected under 35 U.S.C. 102(e) as being anticipated by Gupta et al. ("Routing Lookups in Hardware at Memory Access Speed") hereinafter Gupta.

Referring to claim 1, Gupta discloses in **figures 2-4 and on page 1241-1242** of a computer-readable storage **(two tables shown in figure 2 stored in DRAM)** medium configured to store a data structure, the data structure comprising:

a first lookup table having at least one entry, each of the at least one entry having an information storage portion **[fig. 2, TBL 24]**; and

a second lookup table having at least one block of entries, each entry in the at least one block of entries storing next hop and prefix length information **[fig. 2, TBLlong];**

wherein each at least one entry in the first lookup table is indexable by a segment of an IP destination address [**as disclosed in example 3.1 on page 1242**, where a packet arrives with a destination address 10.54.34.23. The first 24 bits are used as an index into

TBL24, which indicates that the second table must be consulted, clearly establishing that the first lookup table is indexable by a segment of an IP destination address].

the information storage portion of each of the at least one entry in the first lookup table stores next hop and prefix information when there is no route having a prefix matching the index of the entry and a prefix length greater than a predetermined value [**as disclosed in figures 2-4, 3 Proposed Scheme section on page 1241 and in example 3.1 on page 1242**, if X is less than or equal to 24 bits long, it need only be stored in TBL24, in effect; route prefixes shorter than 24-bits are expanded. If a packet arrives with the destination address 10.54.22.147, the first 24 bits are used as an index TB24, and will return an entry with the correct next hop (A)].

the data storage portion of each of the at least one entry in the first lookup table stores a value pointing to a block in the at least one block of entries in the second lookup table when there is a route having a prefix matching the index of the entry a prefix length greater than the predetermined value[**as disclosed in figure 4 and example 3.1 on page 1242**, Assume 10.54/16, 10.54.34/24 and 10.54.34.192/26 are already in the table. The first route requires entries in TBL24 that correspond to the 24-bit prefixes 10.54.0 through 10.54.255 (except for 10.54.34). The second and third routes require that the second table be used because both of them have the same first 24bits and one of them is more than 24bits long. So, in TBL24, we insert a one followed by an index into the entry corresponding to the 10.54.34 prefix. In the second table, we allocate 256 entries starting with memory location 123*256], and

each entry in the block is indexable by an offset of the IP destination address [**as disclosed in figure 4**, each entry number of the IP destination address is indexable by an offset, e.g. 10.54.33, 10.54.34, 10.54.35] as claim.

Referring to claim 2, Gupta discloses each of the at least one entry in the first lookup table including a marker bit indicating whether there is a route having a prefix matching the index of the entry and a prefix length greater than a predetermined value [as disclosed on page 1241, section 3 Proposed Scheme, If X is less than or equal to 24 bits long, it need only be stored in TBL24: the first (marker) bit of the entry is set to zero to indicated that the remaining 15 bits designate the next-hop. If , on the other had, the prefix X is longer than 24 bits, then we use the entry in TBL24 addressed by the first 24 bits of X. We set the first (marker) bit of the entry to one to indicated that the remaining 15 bits contain a pointer to a set of entries in TBLlong] as claim.

Referring to claim 3, Gupta discloses the storage medium is operatively connected to a configurable processor [as disclosed on page 1241, item 5 and on page 1246 in section 5.3 Simulation Results, configurable processor is connected to memory] as claim.

Referring to claim 4, Gupta discloses in **figures 2-4 and on page 1241-1242** computer-readable storage medium **(two tables shown in figure 2 stored in DRAM)** configured to store a data structure, the data structure comprising:

a first lookup table having at least one entry, each of the at least one entry having a bitmap portion and an information storage portion **[fig. 2, TBL 24]**; and

a second lookup table having at least one entry, each entry in the at least one entry storing next hop and prefix length information **[fig. 2, TBLlong]**;

wherein the at least one entry in the first lookup table is indexable by a first portion of an IP destination address [**as disclosed in example 3.1 on page 1242**, where a packet arrives with a destination address 10.54.34.23. The first 24 bits are used as an index into TBL24, which indicates that the second table must be consulted, clearly establishing that the first lookup table is indexable by a portion of an IP destination address], and bits within the bitmap of the at least one entry are indexable by a second portion of the IP destination address [**as disclosed in 3.1 Example on page 1242**, where 10.54/16, with a subnet mask of 16 in the second portion of the address, the first route requires entries in TBL24 that correspond to the 24-bit prefixes 10.54.0 through 10.54.255 except for 10.54.34, clearly establishing that at least one entry is indexable by a second portion of the IP destination address],

the information storage portion of the at least one entry stores next hop and prefix information when the total number of ones in the bitmap of the at least one entry is one of a given set of values [**as disclosed in 3 Proposed Scheme and figure 3 on page 1241**, for a TBL24 entry, if longest route with 24bit prefix is less than 25 bits long, the first bit of the entry is set to zero to indicate that the remaining 15 bits designate the next hop] and

the information storage portion of the at least one entry stores information pointing to an entry in the second lookup table when the total number of ones in the bitmap of the at least one entry is not one of the given set of values [**as disclosed in 3 Proposed Scheme and figure 3 on page 1241**, for a TBL24 entry, if longest route with 24bit prefix is greater than 25 bits long, the first bit of the entry is set to one to indicate that the remaining 15 bits contain a pointer to a set of entries in TBLlong] as claim.

Referring to claim 5, Gupta wherein the first set of values includes one and two [as disclosed in figure 2-4] as claim.

Referring to claim 8, Gupta discloses **in figures 2-4** of a method of performing route lookup **(on two tables in figure 2)** and packet forwarding in a communications network **[in section 3 proposed scheme on page 1241 and 3.1 Examples on pages 1242]**, the method comprising;

receiving an incoming IP address and dividing the address into segment and offset portions [**as disclosed in example 3.1 on page 1242**, where a packet arrives with a destination address 10.54.34.23. The first 24 bits are used as an index into TBL24, which indicates that the second table must be consulted, clearly establishing that the first lookup table is indexable by a segment of an IP destination address. The IP address is also dividing into offset portion as shown in **TBL24 in figure 4** since the entry number 10.54.33 is followed by an offset of that address of 10.54.33]; using a value of the segment to index to a particular entry in a first data structure [**as disclosed in 3 Proposed Scheme on page 1241,** the first table (called TBL24) stores all possible route prefixes that are up to and including, 24-bits long];

checking a marker bit [**as disclosed in 3 Proposed Scheme on page 1241**, the first bit of the entry as the marker bit] of the entry;

if the marker bit is zero, obtaining next hop information and prefix length information for the IP address from the remaining bits of the entry [**as disclosed in 3 Proposed Scheme and in figure 3 on page 1241,** If X is less than or equal to 24 bits long, it need only be stored in TBL24; the first (marker) bit of the entry is set to zero to indicate that the remaining 15 bits designate the next hop];

if the marker bit is one, using the remaining bits of the entry to index to a block of entries in a second data structure, within the block of entries in the second data structure, using the offset to index to a particular entry **[as disclosed in 3 Proposed Scheme and in figure 3 on page 1241,** If the prefix X is longer than 24 bits, then we use the entry in TBL24 addressed by the first 24 bits of X. We set the first bit of the entry to one to indicate that the remaining 15 bit contain a pointer to a set of entries in TBLlong], and

obtaining next hop and prefix length information from the indexed entry in the second data structure [**as disclosed in the 3 paragraph, step 3 of page 1242,** if the first bit equal one, we multiple the remaining 15 bits by 256, add the product to the last 8 bits of the original destination address and use this value as a direct index into TBLlong, which contains the next hop] ; and

using the next hop and prefix length information to forward a packet associated with the IP address to another location on a communications network [**as disclosed on page 1241, item 5, in addition to figures 2-4,** the next hop entries form routing table are downloaded by the general purpose processor into each forwarding table, which are used to make per-packet forwarding decision] as claim.

Referring to claim 13, Gupta **discloses in figures 2-4** a method of updating a data structure **[two tables shown in figure 2 stored in DRAM)** as suitable for use in a route lookup system in a communications network, the method comprising:

receiving an IP route **[10.54.22.147]** having an IP address component, prefix length component and next hop component **[as disclosed on pages 1241 and 1242**, of receiving a packet with a destination address, prefix length either greater, less than or equal to 24bits and a next hop component based on prefix length];

checking a group of entries [as in a data structure indicated by the prefix length component, the group having a size determined by a length of the IP address less the prefix length [**as disclosed in figure 2-4, and 3.1 Examples on page 1242** the first 24 bits are used as an index into TBL24, and will return an entry with the correct next hop (A)]; and

performing a longest match procedure to update the group of entries to have most specific next hop and prefix length information for the group of entries [**as disclosed in 3 Proposed Scheme on page 1241, and 3.1 Examples on page 1242,** when a destination address arrives, a match to the respective table is performed based on the prefix length and group of entries is directed to the specific table based on prefix length to have the most specific next hop];

wherein checking includes

determining whether a given portion of an entry in the group of entries stores next hop and prefix information, or stores an index to a block of next hop and prefix information in another data structure [**as disclosed in 3 Proposed Scheme on page 1241, and 3.1 Examples on page 1242,** when a destination address arrives, a match to the respective table is performed based on the prefix length, if 24 bit prefix is less than 25 bits , the first table stores all possible route and provides Next hop is greater than 24 bits then indexed into the 2nd table]; and

obtaining prefix length and next hop information for the entry based on the determination result [**as disclosed in 3 Proposed Scheme on page 1241, and 3.1 Examples on page 1242**, next hop information and prefix length is obtained based on example of two tables containing three routes].

Allowable Subject Matter

3. Claims 6, 7 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claims 9-12 and 14 allowed.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Or faxed to:

(703)305-3988, (for formal communications intended for entry)

Or:

(703)305-3988 (for informal or draft communications, please label "Proposed" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chirag G Shah whose telephone number is 703-305-5639. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wellington Chin can be reached on 703-305-4366. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ajit Patel
Primary Examiner

cgs
August 5, 2004